REMARKS

Claims 1, 2, 8, and 9 are pending. Claims 3 – 7, and 10 – 11 have been canceled. No claims have been withdrawn from consideration.

The claim amendments are made without prejudice, and without disclaimer of the canceled and/or modified subject matter. Indeed, "[t]he language in the … claims may not capture every nuance of the invention or describe with complete precision the range of its novelty."[1] Thus, "[t]he scope of [the present claims] is not limited to [their] literal terms but instead embraces all equivalents to the claims described."[2]

The amendments to claim 1 do not add new matter. Claim 1 has been amended to require the polymer blend to comprise from 45 to 85 wt% of blend polymers and from 15 to 55 wt% of carbon fillers. This amendment does not add new matter, because the amendment finds support in the specification on page 7, line 29 to page 8, line 2. Claim 1 has also been amended to require that the weight ratio, in the polymer blend, of polyamide to polyether ketone/polyether sulfone is from 1:1.6 to 4:1. This amendment does not add new matter, because the amendment finds support in the specification on page 8, lines 6 to 8.

The cancelation of claim 7 does not add new matter, because the cancelation does not affect the scope of any pending claims.

The Office action rejects claims 1, 2, 4, and 7 – 9 under 35 U.S.C §103(a) over EP 1 011 164 A2 to Saito et al. (hereinafter, "Saito"); US 6,331,586 to Thielen et al. (hereinafter, "Thielen"); and JP 2002-097375 to Shigeru et al. (hereinafter, "Shigeru").

1. The combination would not result in a polymer blend comprising from 10 to 55 wt% carbon fillers comprising conductive black, carbon fibers, and carbon nanotubes.

Claim 1 is directed to a bipolar plate for PEM fuel cells comprising a plastic structure comprising a polymer blend. The polymer blend comprises from 45 to 85 wt%

[1] *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 731, 122 S.Ct. 1831, 1837 (2002).
[2] *Festo*, 535 U.S. at 731, 122 S.Ct. at 1837.

of blend polymers and from 15 to 55 wt% of carbon fillers. The proposed combination of Saito, Thielen, and Shigeru would not result in a polymer blend comprising from 15 to 55 wt % of carbon fillers.

Saito discloses a separator for fuel cells, a process for the production thereof, a solid polymer-type fuel cell using said separator. At page 3, lines 1 – 3, Saito explains, a composition comprises the components in such that the amount of the powdery carbon filler is 200 to 800 parts by weight and the amount of the short fiber is 10 to 300 parts by weight, both per 100 parts by weight of the binder. Recalculated into percent by weight, this is an amount of powdery carbon filler and short fiber of from 67 to 92 % by weight, based on the whole composition.

Thielen et al. disclose conductive polymer blends with finely divided conductive material selectively localized in continuous polymer phase or continuous interface. According to column 11, lines 42 and following, carbon fillers are present in HDPE/TPU systems in an amount of 1% by weight. In addition, a system is disclosed, wherein 0.35% by weight of KETJEN BLACK KEC600JD is present. In addition, in the following paragraph, 3% by weight of Vulcan XC-72 is present in the mentioned HDPE/TPU-system.

The Office action cites Shigeru, after acknowledging, "neither [Saito] nor Thielen expressly teaches that the carbon filler comprises carbon nanotubes, as recited in claim 1."[3] The Office alleges, however, that Shigeru "is directed to a thermoplastic resin composition comprising carbon fiber and carbon nanotube that is suitable for use in a fuel cell separator."[4] As expressed in paragraph [0010] of Shigeru, the thermoplastic resin composition and molding according to Shigeru comprises 0.1 to 15% by weight of carbon fibers.

Thus, a combination of Saito, Thielen, and Shigeru would not result in a bipolar plate according to amended claim 1, comprising a plastic structure comprising a polymer blend comprising 15 to 55 % by weight of carbon fillers comprising conductive black, carbon fibers, and carbon nanotubes.

[3] Page 3, lines 18 – 19 of the Office action mailed October 09, 2008.
[4] Page 3, lines 20 – 21 of the Office action mailed October 09, 2008.

2. The references do not obviate a polymer blend comprising at least one polyamide and at least one polyether ketone or polyether sulfone as blend polymers.

Saito discloses a separator for fuel cells, comprising a binder, a powdery carbon filler, and a short fiber. According to paragraphs [0016] to [0019], the binder used in the invention according to Saito has no particular restriction and can be chosen from a thermosetting resin, a thermoplastic resin, or a rubber. More specifically, Saito provides:

13 examples of thermosetting resins

> **[0017]** As the thermosetting resin, there can be mentioned, for example, phenolic resin, polycarbodiimide resin, furfuryl alcohol resin, epoxy resin, cellulose, urea resin, melamine resin, unsaturated polyester resin, silicone resin, diallyl phthalate resin, bismaleimidetriazine resin, polyaminobismaleimide resin and aromatic polyimide resin. They can be used singly or in admixture of two or more kinds. [5]

30 examples of thermoplastic resins

> **[0018]** As the thermoplastic resin, there can be mentioned, for example, polyethylene, polystyrene, polypropylene, polymethyl methacrylate, polyethylene terephthalate, polybutylene terephthalate, polyethersulfone, polycarbonate, polyoxamethylene, polyamide, polyimide, polyamideimide, polyvinyl alcohol, polyvinyl chloride, polyphenylsulfone, polyetherether ketone, polysulfone, polyether ketone, polyarylate, polyetherimide, polymethylpentene, fluororesin, polyoxybenzoyl ester resin, liquid crystal polyester resin, aromatic polyester, polyacetal, polyallylsulfone, polybenzimidazole, polyethernitrile, polythioethersulfone and polyphenylene ether. They can be used singly or in admixture of two or more kinds. [6]

16 examples of rubbers

> **[0019]** As the rubber, there can be mentioned, for example, fluororubber, silicone rubber, butyl rubber, chloroprene rubber, nitrile rubber, nitrile-chloroprene rubber, chlorinated butyl rubber, epichlorohydrin rubber, epichlorohydrin-ethylene oxide rubber, epichlorohydrin-ethylene oxide-acrylic glycidyl ether terpolymer, urethane rubber, acrylic rubber, ethylene-propylene rubber, styrene rubber, butadiene rubber and natural rubber. They can be used singly or in admixture of two or more kinds. [7]

In reconstructing the present invention by hindsight reasoning, the Office action notes that amongst at least 59 examples of possible binders, Saito mention polyethersulfone, polyamide and polyether ketone.

Saito generally disclose that these thermosetting resins, thermoplastic resins, and rubbers can be used alone or in combination. Of course, no binder comprising a blend of two different thermosetting resins, thermoplastic resins, and rubbers is disclosed. In the examples on pages 6 to 10, Saito discloses many different compositions, none of which involve a blend of two different thermosetting resins, thermoplastic resins, and rubbers.

Based on the enormous number of possible binders disclosed, a person of ordinary skill in the art would understand Saito as teaching that nearly every polymer

[5] Paragraph [0017] of *Saito et al.* (EP 1011164).
[6] Paragraph [0018] of *Saito et al.* (EP 1011164), (emphasis added).
[7] Paragraph [0019] of *Saito et al.* (EP 1011164).

known to the skilled artisan can be used as binder. Moreover, despite the cursory remark that thermosetting resins, thermoplastic resins, and rubbers might be used alone or in combination as binder, the skilled artisan would learn that blends of different polymers are not actually advantageous; no blends were tested.

Perhaps, even more importantly, Saito provides no apparent reason for a skilled artisan to believe that a specific combination of two non-miscible polymers, having different polarities, might be especially desirable.

Thielen discloses conductive polymer blends with finely divided conductive material selectively localized in continuous polymer phase or continuous interphase. Thielen discloses an infinite variety of polymers by stating that "[i]n general, any pair of polymers may be selected for a blend provided that the two polymers present at least some degree of immiscibility and preferably differ in their polarity."[8] Thielen also makes clear that an infinite variety of polymers can be used, stating:

> The polymers in the conductive blend of the invention can be homopolymers, copolymers, terpolymers, and/or polymers containing any number of different repeating units. Further, the polymer can be any type of polymer, such as a random polymer, alternating polymer, grafted polymer, block polymer, star-like polymer and/or comb-like polymer. The polymer can have the structure of an interpenetrating polymer network, simultaneous interpenetrating polymer network, or interpenetrating elastomeric network.[9]

The reference provides a list of specific examples of polymers:

> Specific examples of polymers include, but are not limited to, linear high molecular weight polymers such as polyethylene, poly(vinylchloride), polyisobutylene, polystyrene, polycaprolactam (nylon), polyisoprene, and the like.[10]

However, in reconstructing the present invention by hindsight reasoning, the Office action focuses on only two general classes of polymers within a listing of at least 30 general classes of polymers.

[8] Column 6, lines 45 – 48 of *Thielen et al.*, US 6,331,586.
[9] Column 6, lines 8 – 16 of *Thielen et al.*, US 6,331,586.
[10] Column 6, lines 17 – 21 of *Thielen et al.*, US 6,331,586.

> Other general classes of polymers include polyamides, polycarbonates, polyelectrolytes, polyesters, polyethers, (polyhydroxy)benzenes, polyimides, polymers containing sulfur (such as polysulfides, (polyphenylene) sulfide, and polysulfones), polyolefins, polymethylbenzenes, polystyrene and styrene copolymers (ABS included), acetal polymers, acrylic polymers, acrylonitrile polymers and copolymers, polyolefins containing halogen (such as polyvinyl chloride and polyvinylidene chloride), fluoropolymers, ionomeric polymers, polymers containing ketone group(s), liquid crystal polymers, polyamide-imides, polymers containing olefinic double bond(s) (such as polybutadiene, polydicyclopentadiene), polyolefin copolymers, polyphenylene oxides, polyurethanes, thermoplastic elastomers and the like. [11]

Applicants respectfully submit that Theilen also teaches that these polymer blends are used in combination with a very low amount of carbon black. For example, according to example 1 of Thielen, 1% by weight of carbon black is used in a blend of PP and EPR. According to Thielen, polymer blends made of at least two polymers chosen from the group as mentioned above, can be used in connection with very low amounts of carbon black, for example 1% by weight, in order to obtain conductive polymer blends. The specific combinations according to Thielen comprise polyethylene and polystyrene, polystyrene and polyacrylates, polypropylene and polyaminde, or polypropylene and polycarbonate. A person having ordinary skill in the art is, therefore, taught that polymers based on olefinic monomers like ethylene, propylene, styrene, or acrylic acid esters should be combined in order to obtain the blend with the specific features as mentioned above.

In addition, Thielen discloses only generally that these conductive polymers can be used in components for electronic equipment (*See* column 11, lines 31 to 37). Applicants respectfully submit this general teaching does not obviate the present invention which is directed specifically to a bipolar plate for PEM fuel cells.

"To establish a *prima facie* case of obviousness in a genus-species chemical composition situation … it is essential that Office personnel find some motivation or suggestion to make the claimed invention in light of the prior art teachings."[12] Applicants respectfully stress that the "the claimed invention" requires a very specific combination, which is not suggested by the cited references. It is also worth mentioning

[11] Column 6, lines 21 – 34 of *Thielen et al.*, US 6,331,586 (emphasis added).
[12] MPEP § 2144.08.

that MPEP § 2144.08 explains that "[i]f ... a [preferred] species or subgenus is structurally similar to that claimed, its disclosure may motivate one of ordinary skill in the art to choose the claimed species or subgenus from the genus, based on the reasonable expectation that structurally similar species usually have similar properties." MPEP § 2144.08 instructs examiners to consider whether the cited references provide "any teachings of a 'typical,' 'preferred,' or 'optimum' species or subgenus within the disclosed genus."[13] Applicants respectfully submit that due consideration of the teachings of which combinations are preferred by the cited references, further undermines the present rejection.

Indeed, the polymer blends disclosed by Thielen as being very preferred are combinations comprising two polymers, which have very similar chemical structures, for example, a combination of high density polyethylene and ethylene propylene rubber. On the other hand, the present claims require a polymer blend that includes at least one polyamide and at least one polyether ketone or polyether sulfone as blend polymers. Thus, a skilled artisan would not learn from Thielen that polyether sulfones or polyether ketones are suitable polymers in a polymer blend.

3. The references do not obviate a polymer blend comprising at least one polyamide and at least one polyether ketone or polyether sulfone as blend polymers, wherein the weight ratio, in the polymer blend, of polyamide to polyether ketone/polyether sulfone is from 1:1:6 to 4:1.

In addition to failing to disclose the specific combination of polymers, the cited references also fail to disclose the very specific weight ratio required by the amended claims.

For at least these reasons, applicants respectfully submit the claimed invention is not obvious in view of the cited references. Favorable reconsideration is respectfully requested.

[13] MPEP § 2144.08.

Petition for Extension of Time

Applicants respectfully request that a one-month extension of time be granted in this case. The respective $130.00 fee is paid by credit card.

Fee Authorization

Please charge any shortage in fees due in connection with the filing of this paper, including any shortage in Extension of Time fees, to Deposit Account 14.1437. Please credit any excess fees to such account.

Conclusion

The present application is in condition for allowance, and applicants respectfully request favorable action. In order to facilitate the resolution of any questions, the Examiner is welcome to contact the undersigned by phone.

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Respectfully submitted,
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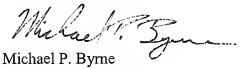

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